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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/877,962	06/08/2001	Chandrika Kamath	IL-10716	2172

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EXAMINER	
TUCKER, WESLEY J	

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 05/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/877,962	Applicant(s) KAMATH ET AL.	
	Examiner Wes Tucker	Art Unit 2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4* is/are allowed.

6)☒ Claim(s) *1-3* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

New corrected drawings are required in this application because Fig. 8 is not of suitable quality for publication. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of IEEE publication Adaptive Wavelet Thresholding for Image Denoising and Compression by Chang et al. and U.S. Patent 6,124,866 to Asano et al.

With regard to claim 1, Chang discloses a wavelet transforming module for wavelet transforming data (p.6, lines 4-6, and p. 27, Fig.7), a threshold wavelet

coefficients module for thresholding wavelet coefficients of said wavelet transformed data (p.6 equation 4, and p. 27, Fig.7), and an inverse wavelet transforming module for inverse wavelet transforming said data to obtain denoised data (p.27, Fig.7). Here Chang discloses wavelet transforming image data, soft-thresholding wavelet coefficients to remove noise, and then inverse transforming data to achieve a noise removed output image.

Chang also discloses a reading and displaying module for reading and displaying said data (p.6, last 2 lines). Here it is understood that after noise removal is performed that there must be a displaying module to view the "visually pleasant" or "recovered" images.

Chang does not disclose a partitioning and distributing module for partitioning said data into regions and distributing said regions onto said processors. It is known in the art to perform calculations on segmented images in parallel processing in order to improve processing time and efficiency. Asano discloses a multiprocessor system that divides a picture into a plurality of blocks and then performs image processing on multiple processors in parallel in order shorten waiting time and increase efficiency (column 5, lines 54-62). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use multiple image processors in parallel as taught by Asano (column 5, lines 60-61) in the wavelet coefficient thresholding noise removal of Chang in order to increase efficiency and decrease processing time.

Asano further discloses a communication requirements module for determining communication requirements among said processors (column 6, lines 20-35). Asano

discloses a bus control method to provide communication among processors such as when and where the next block of image data is to be processed.

With regard to a linking system for linking all of the above mentioned modules, it is understood that there must inherently be some linking or control system distribute images and image section to processors that must perform wavelet transforming image enhancements. Chang discloses in Fig. 7 a linking system linking reading (input) and displaying (output) modules, wavelet transforming module, coefficient thresholding wavelet noise reducing module, and inverse wavelet transform module. As modified by Asano, Chang would further disclose that the partitioning and distributing module would link or connect to the wavelet transform modules in Fig. 7 to transform the input data from the partitioning and distributing module to perform the wavelet denoising processing.

With regard to claim 2, Chang discloses thresholding said wavelet coefficients according to said wavelet denoising techniques (p.6 equation 4 and below, and p. 27, Fig.7); transforming said wavelet coefficients according to said wavelet denoising techniques (p.6 equation 4 and below, and p.27, Fig.7); and transforming the denoised data back into its original reading and displaying data format (p.27, Fig. 7).

Chang does not disclose the partitioning of the data into regions and distributing the data portions to parallel processors. It is known in the art to perform calculations on segmented images in parallel processing in order to improve processing time and efficiency. Asano discloses partitioning said data into regions and distributing said

regions onto said processors (column 5, lines 54-62). Ando further discloses determining communication requirements among said processors (column 6, lines 20-35). Asano discloses a multiprocessor system that divides a picture into a plurality of blocks and then performs image processing on multiple processors in parallel in order shorten waiting time and increase efficiency (column 5, lines 54-62). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use multiple image processors in parallel as taught by Asano (column 5, lines 60-61) in the wavelet coefficient thresholding noise removal of Chang in order to increase efficiency and decrease processing time.

In the combination of Chang and Asano, it is understood that the communication between processors would be made according to the wavelet denoising techniques used. Asano displays a task control unit (Fig.1, element 7) used to distribute data to the multiple processors to and the communication between the processors would be dependant on the noise removal method of Chang in the combination of Chang and Asano.

Chang and Asano do not expressly disclose reading and displaying said data in different formats or transforming said data into different multiresolution levels with the wavelet transformed according to said wavelet denoising technique and using said communication requirements, said transformed data containing wavelet coefficients. Chang discloses different resolution representations (p.6, section II, paragraph 2). Chang refers to largest or coarsest scale and low resolution residual implying that different resolutions are used in representing wavelet transforms. It is known in the art

that wavelet transforms are used for different mulitresolution formats. Wavelet transforms are used to represent image data in a hierarchical way in multiple resolution formats. Therefore using wavelet transforms inherently represents the image data in different image formats and resolutions.

With regard to claim 3, Chang discloses a wavelet denoising technique and thresholding said wavelet coefficients according to said wavelet denoising technique requirements using a thresholding module (p.6, equation 4 and below, and p.27, Fig.7). Chang does not disclose a parallel object oriented module. Asano discloses a parallel object oriented method for processing image data (column 5, lines 54-62). It would be obvious to combine the wavelet transforming method of Chang with the parallel processor system of Asano for the same reasons stated in claims 1 and 2. Asano teaches that parallel processing shortens waiting time and thus increases efficiency in processing large amounts of image data.

Asano discloses reading, writing, and displaying engineering, business and other data in different formats using a reading, writing, and displaying parallel object-oriented module (column 5, lines 44-53). Here Asano discloses reading and writing data in multiple processors operating in parallel. It is understood that the data can be any form of digital data.

Asano discloses partitioning said data into regions and distributing said regions onto said parallel object-oriented processors using a partitioning and distributing parallel object-oriented module (column 5, lines 54-62).

Asano discloses determining communication requirements among said parallel object oriented processors (column 5, lines 45-50). Asano refers to a task control unit and a control bus determining processing tasks for the different processors. In the combination of Chang and Asano it is understood that the communication requirements among Asano's disclosed parallel processors would be made according to the disclosed wavelet denoising technique of Chang.

Chang discloses transforming said data onto different multi-resolution levels with the forward wavelet transform according to said wavelet denoising technique (p.6, lines 10-15 and equation 4 and below). It is known in the art that wavelet transforms are used for different multi-resolution formats. Wavelet transforms are used to represent image data in a hierarchical way in multiple resolution formats. Therefore using wavelet transforms inherently represents the image data in different image formats and resolutions. The combination of Chang and Asano would use said communication requirements using Asano's data transforming parallel object-oriented module, said transformed data containing Chang's wavelet coefficients.

Chang discloses transforming said thresholded wavelet coefficients using the inverse wavelet transform according to said wavelet denoising technique requirements using a transforming thresholded wavelet module, to obtain final denoised data (p.27, Fig.7). The combination of Chang and Asano would provide Asano's parallel object-oriented module.

The methods of Chang and Asano are inherently performed by the use of a computer program. Therefore the modules would be linked appropriately by some form of computer programming such as a scripting language.

Allowable Subject Matter

Claim 4 is allowed.

The following is an examiner's statement of reasons for allowance: The prior art does not anticipate or reasonably suggest the use of establishing an object-oriented library of denoising techniques based on thresholding of wavelet coefficients including a suite of different wavelet filters, wavelet transforms, boundary treatment rules, threshold calculation methods, threshold application functions, and noise estimation techniques and choosing said denoising technique from that library. Also the prior art does not reasonably teach or suggest mapping said denoising technique onto said parallel object-oriented library of denoising techniques.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 703-305-6700. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wes Tucker

5-3-04

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